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Editor's Note

Summer is a busy time at the Institute. Staff are immersed in the field season and the campus is full of new faces, from summer research assistants and Research Experiences for Undergraduates students to school children in the IES Summer Ecology Day Camp. Adding to the hustle and bustle, August marked the annual Ecological Society of America meeting, where staff members presented findings from 21 different IES research projects.

This edition of the IES Newsletter focuses on issues that are relevant to most homeowners. The first article, on the IES Greening Initiative, highlights ways of becoming a better environmental steward through wise resource consumption. Green homes make good neighbors, though this sentiment is seldom expressed for deer. The second article deals with managing your home landscape in the face of growing, and often hungry, deer populations.

The *IES Newsletter* is published by the Institute of Ecosystem Studies, located at the Mary Flagler Cary Arboretum in Millbrook, New York.

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The Greening of IES

For over two decades, the Institute of Ecosystem Studies has been generating important research about how ecosystems function. From understanding how acid rain is formed to monitoring the biological health of the Hudson River, IES research provides a scientific foundation for environmental conservation efforts—both locally and globally. In many cases, maintaining the Earth's ecological vitality depends on people treading more lightly and using resources more wisely.

In this spirit of responsible stewardship, the Institute is embarking on a facility greening plan. The plan's goal is to reduce the environmental and financial costs associated with running a multi-building research campus. Because, in the words of Institute President and Director Dr. Gene E. Likens, "It is the right thing to do and the right time to do it."

Treading Lightly

"Ecological footprint"* is a term ecologists use to describe the impact that a person, building, or group of buildings has on its local and global environment. Consider how the choices that you make as a consumer affect the world around you. Do you live in an energy-efficient home? How much water does your household use? Does your car get good gas mileage? These and other consumption decisions, in aggregate, define an individual's ecological footprint, with resource-conscious choices resulting in smaller footprints.

When greening a household or a complex of buildings, the goal is the same—minimizing the environmental costs of day-to-day life in a way that is ecologically and fiscally responsible. By using resources wisely and employing energy-saving technologies, green facilities are less dependent on fossil fuel, generate less waste, produce fewer toxic emissions, and conserve water resources. By initiating a greening plan, the Institute joins a number of prominent organizations that have made greening a priority, including the U.S. Environmental Protection Agency.

A Greening Plan

An audit by the New York State Energy Research and Development Authority (NY-SERDA)** helped the Institute identify campus improvements that would yield the greatest resource conservation return. Priority greening upgrades include: replacing the glass panels



Replacing the greenhouse panels is just one step in the Institute's greening plan. Updating the greenhouse will reduce heating expenses by up to fifty percent!

on the IES Greenhouse complex, upgrading the heating and cooling system in the Gene E. Likens Laboratory, replacing the lighting in several campus buildings, introducing hybrid vehicles to the auto fleet, installing water-conserving toilets, and using green energy whenever economically possible.

IES Physical Plant Manager Brian Croghan, who is supervising the improvements, comments, "The priority upgrades represent our first major steps in becoming a green facility. Once they are implemented, we will continue to incorporate new technologies and methods as they emerge. Facility greening does not have a beginning and endpoint, it's a fundamental change in an organization's operational philosophy."

Phase One: Greening the Greenhouse

A tropical paradise with over 1,300 species of plants, the IES Greenhouse serves as a resource for scientists, educators and the community. Over the past 25 years, research conducted in the facility has shed light on plant interactions, invasive species, and the impact of air pollutants on plant growth. It serves as a model for integrated pest management and is a propagation site for the Institute's innovative Native Plant Program. A living classroom for IES School Programs, each year nearly 1,000 students learn about botany through hands-on lessons with the greenhouse's diverse plant collection. Free and open to the public, the site is a popular destination for garden clubs and plant lovers.

Not all greenhouses are created equal. Built in 1972, to support the Mary Cary Flagler Arboretum, the greenhouse was constructed out of single-pane glass with a low insulation value. This translates into tremendous heat loss in the winter. Annually, over 28,000 gallons of fuel oil are burned to heat the 14,718 square foot com-

continued on page 3

Managing Deer in Your Landscape: An Interview with Brad Roeller

Deer are a familiar sight in the Northeast. Their overabundance has led to a suite of problems, ranging from the destruction of forest ecosystems to an increase in automobile accidents. As deer numbers rise, their appetites have outpaced natural food resources, leaving many forested ecosystems overbrowsed. It is no surprise, then, that deer have become accustomed to feeding in managed places, such as roadsides and gardens.

While less severe than the threats they pose to forest health and human safety, deer have become a serious nuisance for northeastern gardeners. The wide array of deer deterrents sold at gardening stores—from wolf calls to electrified salt licks—is testimony to both the problem and the frustration it brings. This month, I sat down with IES Grounds and Display Gardens Manager Brad Roeller to discuss the perils of gardening when deer are your neighbors.

Having spent the past several decades overseeing the Institute's display gardens, including several experimental deer browse beds, Brad has extensive knowledge about deer resistant plants and deer deterrents. He's written and lectured on the topic, most recently in the June issue of *Fine Gardening* magazine. This October, Brad will teach an IES Continuing Education Course titled, *Deer-Proofing Your Landscape*.

What sparked your interest in deer resistant gardening?

Since I began working on the grounds in the 1970's, I've had to deal with deer in a variety of landscape situations, from nursery production to display beds. In the Cary Arboretum days, when our focus was on woody plant

propagation, we had to erect a large chain-link fence around our 15-acre nursery. I learned very quickly that resident deer enjoyed eating imported ornamentals as much as native plants!

When did deer become such a nuisance?

Up until the early 1960's, in our area, and much of the Northeast, land was intensively used for agriculture. If I showed you an aerial photo of the IES grounds in the 1930's, you wouldn't recognize it. The Carys, who owned the land, leased most of the property to farmers. Lack of tree cover and hunting kept deer numbers very low.

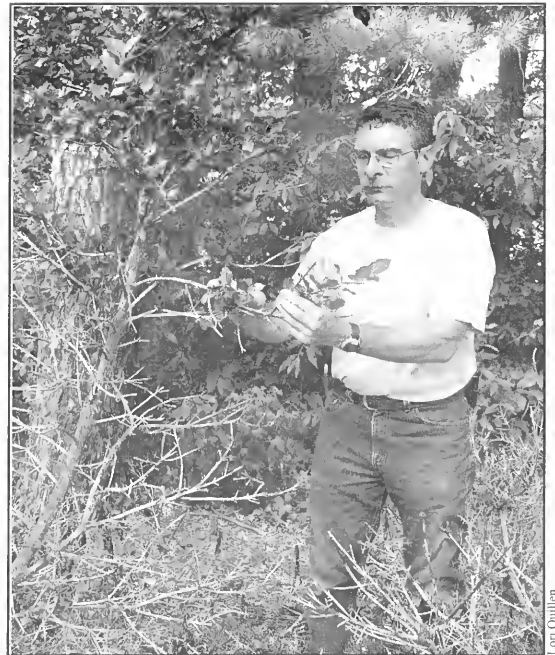
Fast-forward to the present; what was once farmland is now 40-year-old woodlands with everything deer need to thrive—cover protection and woody browse, a crucial winter food resource. Also, whereas hunting was once the norm, cultural attitudes have shifted and hunters are becoming scarce.

Deer populations are now larger than they have ever been and growing. In the 1980's biologists calculated that there were 600,000 deer in the 15 Northeastern states; now there are over 3 million!

What are some frequently asked questions about deer resistant gardening?

The number one question is, "what can I plant that the deer won't eat?" quickly followed by, "how can I revive plants that have been damaged by deer?" Those are the types of questions that motivated the Deer Browse Garden at IES.

Tell me about the Deer Browse Garden. Started in 1991, its objective was to document how plants resisted deer browse in a landscape setting. I tested Cornell Cooperative Extension's deer-resistant plant list as well as novel species that I was exposed to by working in the Arboretum. The garden was also an invaluable site for testing an array of deer deterrents, from repellents to physical barriers. I took everything that was on the shelves and gave it a thorough evaluation. Each product was assessed for several years because the environmental factors influencing deer browse intensity—such as snow cover, acorn production, and deer herd size—fluctuate annually.



Brad Roeller inspecting browse damage on a holly. The lower portion of the plant has been stripped bare.

What important lessons have you learned from the Deer Browse Garden?

When natural food supplies are low, deer are more apt to feed on ornamental plantings. Picking an effective deer deterrent requires being cued into the factors that regulate natural resource scarcity. In years where resources are scarce and deer are abundant, you need to be more vigilant.

When deer find your landscape, you have to take persistent deterrent measures. Mother deer pass foraging grounds on to their offspring; you don't want your yard to become established feeding territory! Once fed on, your ornamentals will become a constant target.

What deterrents do you use?

I've had success with physical barriers, such as fences, and repellents. Repellents can be scent or taste based; the most reliable products use a combination of the two. Deer rely on olfactory cues for protection, making them hesitant to enter areas with too much odor.

My homemade repellent costs less than fifty cents a gallon. The recipe is simple, for every gallon of water add in: 1 egg, ½ cup of whole milk, 1 tablespoon of cooking oil, and 1 tablespoon of lemon dishwashing soap. For an added punch, add 1 tablespoon of hot sauce and 5-6 drops of rosemary oil. Apply to vulnerable woody plants every 10 days, from late spring to fall. In the dormant season, I recommend blood-derived repellents and products containing the fungicide thiram, as they require less-frequent application. When spraying is not an option, due to weather conditions, physical barriers are a good alternative.

Brad's Top 10 Landscape Protection Strategies

- ❖ Proper Plant Selection
- ❖ Become An "Environmental Forecaster"
- ❖ Know The Deer In Your Neighborhood
- ❖ Spray New Plantings
- ❖ Plan On Protecting Vulnerable Plants
- ❖ Use Food Plots to Attract Deer Away From Landscape Plantings
- ❖ Encourage Neighborhood Strategies For Deer Protection
- ❖ When Conditions Warrant, Use Physical Barriers
- ❖ Develop A Year-Round Strategy
- ❖ Don't Fully Rely on Repellents

To view an in-depth version of this list and more articles on the topic, visit: www.ecostudies.org/gardening_tips.html

continued on page 3

Greening, continued from page 1

plex. The renovation of the IES Greenhouse complex, currently underway, is a core project in the Institute's greening plan.

The Institute is in the process of replacing the glass panels with double-pane acrylic panels, an upgrade that will reduce fuel costs by up to fifty percent. By improving energy efficiency and minimizing fuel dependence, the panel upgrades will reduce the Institute's carbon dioxide emissions by more than 90 tons each year. The upgrade, expected to be completed in late September, also will help ensure the long-term financial viability of the facility.

The 3,000 glass panels removed from the greenhouse will be recycled. Hudson Valley artist Lillian Maurer, whose work was recently displayed at the Byrdcliffe Art Colony in Woodstock, NY, has requested 1,000 of the panels, to be used in an outdoor sculpture. Several local homeowners will use an additional 200 panels to construct backyard greenhouses. Brian Croghan stresses, "By the end of the greenhouse upgrade, our goal is to have all of the older panels placed in a second-use situation."

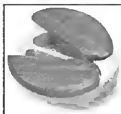
Looking Toward the Future

Conserving our environment is a shared goal that is largely dependent on informed consumer choices. While greening comes with a suite of hurdles early on, most notably changes in infrastructure and habits, long-term benefits far outweigh initial investments. Over the next several years, as the Institute achieves the greening goals laid out by NYSERDA's audit, the organization looks forward to serving as a model for businesses and individuals looking to minimize their ecological footprints. ●

**Want to learn more about your ecological footprint? Visit: <http://www.earthday.net/footprint/index.asp>*

***Private homeowners can receive similar audits through NYSERDA. Learn more about making your home energy efficient at www.getenergywise.org*

Promoting Green Merchandise



Interested in becoming a greener consumer? Consider visiting the IES Ecology Shop. By promoting sustainable merchandise and eco-

logically responsible goods, the IES Ecology Shop offers products that protect resources and educate consumers about environmental issues. Merchandise includes shade grown coffee, sustainably harvested hardwood products, reclaimed glassware, and recycled paper. See back calendar for hours!

The Hudson River Foundation Supports IES River Research

The Hudson River Foundation recently granted \$92,982 to the Institute to support the organization's continued research on the Hudson River. Funding will allow Institute scientists to gain a better understanding of the river's food web through an analysis of several long-term datasets. This research will help address a range of management questions, including the viability of resident fish populations and the river's response to invasive species, such as zebra mussels.



Institute scientists have been monitoring the Hudson River for over two decades. During that time, the organization has had a productive relationship with the Hudson River Foundation. To date, IES research funded by the Foundation has generated 62 publications on the River.

Dr. Dennis J. Suszkowski, Director of Science at the Foundation, notes, "We began issuing grants in 1983, the year IES was founded. At that time, little was known about the freshwater tidal Hudson. It quickly became evident that Institute scientists were capable of collaboratively addressing complex questions about ecosystem function in this stretch of the river."

When asked what made the Institute's proposal an attractive funding prospect, Suszkowski commented that, "We are confident that the project will result in data that will improve our understanding of the river ecosystem. This information is vital to organizations, like ours, that strive to make science an integral part of the policy and management decisions impacting the Hudson River and its wetlands."

IES Scientist Honored by CERC

Institute scientist Dr. Steward T. A. Pickett was recently honored with an *Innovators in Conservation Award* by the Center for Research and Conservation (CERC) at Columbia University. Since 1998, Dr. Pickett has served as the principle investigator of the Baltimore Ecosystem Study, a long-term ecological research project that is focused on understanding how environmental, social, and economic factors shape the urban environment.

In accepting the award, Dr. Pickett noted, "I hope that BES advances in urban ecology will help make cities more hospitable places to live. Things like improved water quality and increased green spaces not only enhance the quality of life for city dwellers, they help foster and preserve urban biodiversity. This, in turn, reduces conservation pressures in wild and rural lands."

To learn more about the Baltimore Ecosystem Study, visit <http://www.besler.org/>

Managing, continued from page 2

What are some of your favorite deer resistant plants?

I enjoy gardening with ferns and hellebores. I'd encourage readers to peruse my deer-resistant plant lists, found online at www.ecostudies.org/gardening_tips.html. These lists are most applicable to the Hudson Valley area; deer resistance can vary by location.

What's your fall deer-browse forecast?

This could be a good winter for woody ornamentals. Grasses and forbs are abundant, the oaks look like they are going to produce a large acorn crop, and, perhaps most importantly, our resident deer herd is lower than previous years.

What are your plans for the future?

Over the past decade, we've developed a rigorous and unbiased deer deterrent testing system. I think the gardening community would benefit from our continued insights. From personal experience, I know a lot of products on the market make unsubstantiated, and in some cases impossible, label claims.

Two new areas I'd like to explore are ultrasonic deterrents, which act like auditory fences, and double fencing techniques. It turns out that deer are hesitant to cross double-barriers due to poor depth perception. I am investigating how different double fencing techniques influence deer presence, from monofilament fishing line to traditional Cape Cod fences. ●

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Newsletter

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Calendar

CONTINUING EDUCATION

Below is a sampling of class offerings. To receive the complete brochure, please call 845-677-9643, or visit our web site at www.ecostudies.org/cep.html.

Gardening

- Sept. 17 (1 Sat.): **Compost Tea Time!**
- Sept. 19 (1 Mon.): **Meadow Style Gardens**
- Sept. 24 (1 Sat.): **Fall Wild Plant Identification**
- Oct. 1 (6 Sat.): **Soil Science**
- Oct. 1 (1 Sat.): **Perennial Garden Design Primer**
- Oct. 11 (1 Tues.): **The White Garden**
- Oct. 16 (1 Sun.): **Planting and Transplanting Trees and Shrubs**
- Oct. 17 (1 Mon.): **Deer-proofing Your Landscape**

Landscape Design

- Sept. 14 (7 Weds.): **Graphics**
- Sept. 20 (3 Tues.): **Ecological Landscape Design: Successful Design with Native Plants**

Natural Illustration

- Oct 15 (Sat. & Sun.): **Drawing Animals**

Green Landscaping: A Symposium

Save the Date: November 15th, 2005

This fall, the Institute will be holding a full-day symposium aimed at helping land use professionals and interested homeowners take a more sustainable approach to landscaping. Funded by Central Hudson Gas & Electric Corporation, the session is free and open to the public. Lectures will include: The Sustainable Landscape: A Responsible Approach for the 21st Century, Creating and Restoring Biodiversity in Our Backyards, and the Ecology of Streams and Riparian Buffers. The event also will feature an overview of regional watershed protection efforts, a poster exhibit, a Q&A sessions, and a catered lunch. For more information, or to reserve a seat, please contact the IES Continuing Education Office at 845-677-9643.

IES SEMINARS

Free scientific seminars are held at 11am on Fridays in the auditorium from September until early May. The fall schedule will be available online in September.

SATURDAY ECOLOGY PROGRAMS

Free and open to the public. Children age 6 and up are welcome with an accompanying adult. Programs begin at the Gifford House Visitor and Education Center, located at 181 Sharon Turnpike in Millbrook, NY. Questions? Call 845-677-7600 ext. 317. Information on upcoming programs is also available online at www.ecostudies.org/saturday.html.

IES Participates in the 6th Annual Hudson River Valley Ramble

Land Use History: An Interpretive Walk September 17, 10am to 12pm



Learn about the ecology of land use on an interpretive walk on the Wappinger Creek Trail with IES Forest Ecologist Dr. Charles Canham. Visitors will explore a range of habitats from forests and old fields to wetlands. Dr. Canham will discuss how plant life reflects past land use patterns and natural succession. The walk will be 1.3 miles. Please wear sturdy closed shoes and pants.

THE ECOLOGY SHOP

Looking for a unique gift? The IES Ecology Shop features an assortment of nature and gardening gifts. Many items are fair-trade, recycled, or otherwise Earth-friendly, so you can feel good about your purchases. Senior citizens receive 10% off on Wednesdays.

GREENHOUSE

The Greenhouse is a year-round tropical plant paradise and a site for controlled environmental research. Managed using integrated pest management, plants thrive in its pesticide-free environment! Open daily until 3:30pm with a free permit (see HOURS).

HOURS

Summer Hours: April 1 - September 30

Public Attractions: Mon.-Sat., 9-6, Sun. 1-6; closed public holidays. The greenhouse closes at 3:30 daily.
The Ecology Shop: Mon.-Fri., 11-5, Sat. 9-5, Sun. 1-5. (Please note: The shop is closed Mon.-Sat. from 1-1:30.)
Required free permits are available at the Gifford House Visitor and Education Center until one hour before closing time.

THE INSTITUTE'S ALDO LEOPOLD SOCIETY

Through their generous support of IES research and education programs, Aldo Leopold Society (ALS) members invest in ecological understanding. In addition to receiving benefits and discounts, ALS members are invited to special lectures, excursions and science updates. To learn more, call the Development Office at 845-677-7600 ext. 120.

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... for education, general information and
The Ecology Shop:

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